REMARKS

Examiner Interview

We thank the Examiner for taking the time to discuss the case in person with applicants' representation Marc Wefers on August 1, 2006. During the interview, we explained the definition of the term d_{50} and pointed out differences between the claimed invention and the cited art. As noted in the Examiner's Interview Summary mailed August 11, 2006, the Examiner agreed that applicants' arguments have merit, but asked for a formal written submission to better document the arguments.

Drawings

The action objects to the drawings because the claimed shape of the particles recited in respective dependent claims 18, 19, 29, and 30 is not shown in the figures as allegedly required by 37 CFR § 1.83(a). While we do not concede the necessity of depicting the claimed "substantially spherical" or "substantially flakelike" particles in the figures, we have canceled these claims to expedite allowance and moot the objection.

Section 112, Written Description Rejection – Mean grain diameter d_{50}

The Action rejects claims 17 and 28 because:

> The specification does not disclose the definition of the "mean grain diameter d_{50}" as recited in claims 17 and 28. Note that in the IDS filed on 10/19/2005, Applicants defined the "mean grain diameter d_{50}" is [sic] the median particle diameter based on the number-distribution (i.e., half of the particles have a diameter greater than or equal to this diameter and the other half of the particles have a diameter less than or equal to this number.) (Action at page 4.)

As explained during the Examiner interview, the well-understood meaning of the term d_{50} is just as we stated in the IDS. To improve clarity, we have amended the claims to make this explicit. Specifically, we have amended independent claims 17 and 28 to replace the language "a mean grain diameter $d_{50} \leq 5$ μm" with -- a median diameter ≤ 5 μm, wherein 50% of said pigments have a grain diameter greater than said median diameter and 50% of said pigments

have a grain diameter less than said median diameter --. The written description support for this amendment is the explicit disclosure of the term "d_{50}."

Factual findings by the administrative law judge in during the ITC litigation referenced in our 10/19/05 IDS clearly support this position:

> [T]he ordinary meaning of the technical term "d_{50}" represents the median diameter, which means the diameter where 50% of the particles are smaller and 50% of the particles are larger. (Initial Determination on Violation of Section 337 at page 29 – reference CS in 10/19/05 IDS).
>
> It is clear that the inventors intended the claim limitation ["mean grain diameter d_{50}"] to be "median" based on their use of the universally accepted symbol for median, d_{50}. (Initial Determination on Violation of Section 337 at page 39 – reference CS in 10/19/05 IDS).

Thus, the amended language in claims 17 and 28 reflect the well understood meaning for the term d_{50}.[1]

Notably, this definition for d_{50} is "by number" in that it refers to the *particles* themselves. Although not as simple, it is also possible to calculate a median based on a distribution different from the number of particles. For example, the median diameter based on a volume distribution refers to the diameter for which all of the particles having a diameter less than this median diameter make up half of the total volume for the particles and all of the particles having a diameter greater than this median diameter make up the other half of the total volume for the particles.[2]

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[1] We note that the issue before the Administrative Law Judge in the ITC litigation was whether the claim expression "mean grain diameter d_{50}" in the issued claims was indefinite because of the allegedly conflicting terms "mean" and "d_{50}" (i.e., median.) For at least the reasons set forth in documents from the ITC litigation made of record in the present application, we submit that there is no contradiction. However the issue is moot with respect to the present application because the present claims can be amended. Furthermore, we note that the English Abstract of PCT/DE97/02139, from which the present application claims priority, explicitly discloses the expression without the allegedly conflicting term "mean" – specifically it states "a grain diameter d_{50} $\leq$5 µm. (See attached cover sheet from corresponding PCT Patent Publication WO 98/12757.)

[2] See, for example, Particle Size Analysis in Pharmaceutics and Other Industries by Clive Washington at pages 21-22 (Reference DE in 10/19/05 IDS)

Because it is the simplest, we submit that absent any specification to the contrary d_{50} is generally understood by those of ordinary skill in the art to be based on a number distribution ("by number"). This position is supported by further factual findings from the ITC litigation in the context of whether a number distribution or a volume distribution should be used when calculating an average or "mean:"

> Generally, means are calculated by tallying the digits in a given set and dividing the sum by the *number* of digits. See WEBSTER'S NEW WORLD DICTIONARY OF AMERICAN ENGLISH 74 (3rd ed. 1994). Indeed, both Osram's expert and Dominant's expert testified as much. (Commission Opinion at page 12 – Reference DA in 10/19/05 IDS, emphasis added).

On the other hand, if a person of ordinary skill in the art wants to specify a median based on a more complicated distribution (e.g., by volume or mass), he or she will generally make this explicit, because it deviates from the simple number distribution. For example, in International Standard ISO 9276-2 "Representation of results of particle size analysis – Part 2: Calculation of average particle sizes/diameters and moments from particle size distributions" (Reference DI in 10/19/05 IDS), the symbol for a median particle size based on a volume distribution is given as: $x_{50,3}$ (see page 3). In this example, the subscript "3" is used to indicate that the distribution on which the median is based is not the ordinary number distribution, but rather a volume distribution.[3]

Further evidence that the term d_{50} is generally understood to refer to a number distribution is provided by The Phosphor Handbook by S. Shionoya and W. M. Yen at pages 498 and 739-742 (see References DK and DL in 10/19/05 IDS). Specifically, page 498 shows a figure

[3] See also, for example, the reference "Phosphor L175" (Reference DG in 10/19/05 IDS), which states "Particle Size Distribution (CILAS 1064) d_{50} = 10,0 -14,0 µm." Although d_{50} is used here without the subscript 3, the references clarifies that the measurement is a "CILAS 1064" measurement, which refers to a light scattering measurement that is understood to yield a by-volume result. This clarification instructs the reader that d_{50} should deviate from the simple by-number definition.

(reproduced below) of a micrograph of phosphor microcrystals and indicates the representative size for the microcrystals by using the term d_{50}.[4]

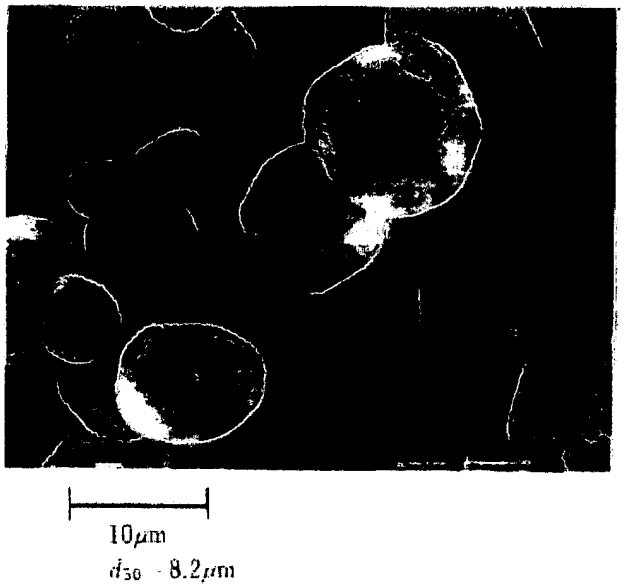

Figure 36 Scanning electron micrographs of Y$_3$Al$_5$O$_{12}$:Tb^{3+} microcrystals

The figure confirms the well-known use of the term "d_{50}" as the median diameter for a distribution of phosphors. Moreover, it provides the clear inference that, absent specification to the contrary, d_{50} is generally understood to be "by-number" because the term is used with reference to a micrograph. Specifically, it is well-understood that such micrographs are used to calculate particle sizes based on number distributions. See, for example, Table 3 on page 740 of The Phosphor Handbook (reproduced below), which explains that image analysis (e.g., optical or electron microscopy) yields a *number* distribution base, whereas sieving, by way of contrast, yields a *weight* distribution base.[5]

[4] We note that this figure is also present in the earlier 1987 Japanese version of The Phosphor Handbook – see Figure 3.3.58 on page 268 of Reference AP in the 10/24/05 IDS.

[5] See also the text on pages 739 and 742 of The Phosphor Handbook.

Table 3 Classification and Characteristics of the Methods for Measuring Particle Size

Principle of measurement	Measuring method	Measurable range of size (nm – µm – mm)	Measured particle size	Distribution base	Sample condition
Image analysis	Optical microscope		Length	Number	Wet, dry
	Electron microscope		Area	Number	Dry
Volume analysis	Sieving		Sieve opening	Weight	Wet, dry
	Coulter counter		Equivalent diameter	Number	Wet
Analysis of particle motion	Gravity sedimentation		Stokes diameter	Weight	Wet, dry
	Centrifugal sedimentation			Weight	Wet, dry
(Sedimentation)	Light transmission			Area	Wet
	Air sieving			Weight	Wet, dry
	Elutriation				
(Inertia force method)	Cascade impactor		Stokes diameter	Weight	Dry
	Cyclone			Weight	Wet, dry
Surface area analysis	Kozeny-Carman method		Specific area diameter		Wet, dry
(Permeability method)	Knudsen method				Dry
(Adsorption method)	BET method		Specific area diameter		Dry
	Fluxion method				Wet, dry
	Heat of wetting				Dry
Electromagnetic wave scattering	Light diffraction		Reduced diameter of sphere	Weight	Wet, dry
	Light scattering (angle distribution)		Mean effective diameter		Wet, dry
	(Doppler width)				Wet, dry
	X-ray diffraction (Sherrer width)				Wet, dry
	X-ray small angle scatter				Wet, dry

Finally, we note that in the present application, d_{50} is used to describe the grain diameter of luminous pigments *dispersed in a resin*. (See, for example, page 4, lines 14-19, page 7, line 21 through page 8, line 8, and page 15, line 18 through page 16, line 2 of the specification.) We submit that in such a context, a person of ordinary skill in the art would further appreciate that d_{50} is a by-number value because microscopy is the most appropriate technique for analyzing such a dispersion, and, as explained above, microscopy yields a by-number result. By way of contrast, the particles cannot be sieved to yield a by-weight result because they are dispersed in the resin.

In view of the above, we submit that the use and context of the term d_{50} in the original specification provides sufficient written description support to amend claims 17 and 28 to recite "said luminous substance pigments having ... a median diameter ≤ 5 µm, wherein 50% of the pigments have a grain diameter greater than said median diameter and 50% of the pigments have a grain diameter less than said median diameter."

Section 112, Written Description Rejection – Remaining Issues

The action also rejects the claims because the claim limitations directed to the grain sizes "are disclosed only in the Summary of the invention, but not in the Description of the preferred embodiment." (Action at page 4.)

We respectfully submit that this is an insufficient basis for a written description rejection. Claims are supported when the specification (including the originally filed claims) are sufficient to show that the inventors were in possession of the claimed invention. (See, e.g., MPEP § 2163(II)(A)(3)(a).) Moreover, there is a strong presumption that claims in the originally filed application have written description support. (See, e.g., MPEP § 2163(I)(A).) Here, the claim limitations in question are both explicitly described in the application as filed and in the originally filed claims (e.g., claims 1, 4, and 10), thereby demonstrating clear possession of the invention. Whether or not such features are explicitly disclosed in the Description of the preferred embodiment section of the application does not alter this conclusion. Accordingly, we ask that the Examiner withdraw the rejection.

Lastly, there is a written description rejection because "[t]he specification does not disclose the iron content in the casting composition is $\leq$20 ppm. Note that page 8 of the Summary of the invention only discloses the iron content in the casting composition is $\leq$5 ppm and the iron content in the casting composition < 20 ppm are advantageous." (Action at page 4.) We traverse.

We presume this rejection pertains to claims 23 and 32, which recite "the iron content in the casting composition is $\leq$20 ppm." We submit that such claims are clearly supported by claim 8 in the original specification as filed, which recites the "casting composition ... comprises a content of iron $\leq$20 ppm." Accordingly, we ask the Examiner to withdraw the rejection.

Section 112, Indefiniteness Rejection

The claims stand rejected because the expression "mean grain diameter d_{50}" is allegedly "unclear as to whether it is being referred to the mathematical average of the grain diameter." (Action at page 5.)

Without conceding the merits of the rejection, we submit that the rejection is now moot because the amendment to claims 17 and 28 makes explicit that the parameter in question is a median diameter, with 50% of the pigments having a grain diameter greater than said median diameter and 50% of the pigments having a grain diameter less than said median diameter. As explained above, the use of the term d_{50} itself provides written description support for this amendment. Accordingly, we ask the Examiner to withdraw the rejection.

Section 103, Obviousness Rejection

All claims stand rejected as allegedly obvious over U.S. Patent No. 5,998,925 ("Shimizu") in view of the 1987 Japanese Version of The Phosphor Handbook (English translation) (hereinafter "the JP Phosphor Handbook").

With regard to independent claims 17 and 28, the action concedes that Shimizu does not disclose the luminous substance pigments having the claimed grain size, but points to page 275 of the JP Phosphor Handbook as disclosing YAG:Ce phosphor particles with the claimed grain size. (Action at page 6.) The action alleges that "it would have been obvious to one of ordinary skill in the art to use the phosphor particles having grains sizes ≤ 20 μm and a mean grain diameter ≤ 5 μm such as taught by the [JP] Phosphor Handbook in the casting composition of Shimizu et al. in order to enhance the color of the emitted light." (Action at page 6.) We disagree.

The disclosure in the JP Handbook describes using the YAG:Ce phosphor particles for an application very different from that disclosed in Shimizu. Specifically, the JP Handbook describes using the YAG:Ce phosphor particles to make a fluorescent screen for a "flying spot tube," which is an example of a CRT-based television screen. (See, e.g., the first paragraph of

page 275.) The emission of light from the fluorescent screen is in response to an electron beam being scanned over the fluorescent screen. For example, the JP Handbook states:

> The frequency response of a color flying spot tube is shown in Figure 3.3.66. For a fluorescent screen that employs PYG it is 80% or more even in the high-frequency region of 1 MHz, and even in a lifetime test lasting 3000 continuous hours *under the excitation conditions of an acceleration voltage of 20 KV and a current density of 2 $\mu A/cm^2$*, it maintains 90% or more of its luminescent output. (Page 275, bottom right column, emphasis added.)

In contrast, Shimizu is directed to phosphors that absorb light at one wavelength and emit it at another wavelength. (See, for example, the Abstract in Shimizu.) Thus, the emission processes in the two references are fundamentally different – cathodeluminescence in the JP Phosphor Handbook (i.e., emission of light in response to an electron beam) and photoluminescence in Shimizu (i.e., emission of light in response to light). Moreover, the structural arrangement of the phosphors are different – a fluorescent screen in the JP Phosphor Handbook versus coating resin 101 filling cup 105a in Shimizu.

There is simply no reason why a person of ordinary skill in the art would select the particle size of the phosphors used in the flying spot tube fluorescent screen described in the JP Phosphor Handbook as the size for the phosphors in Shimizu's cup-shaped, photoluminescent coating resin.

Furthermore, in the corresponding chapter in the English language version of the Phosphor Handbook, there are taught several other sizes for phosphors used in cathode ray tubes, many of which fall *outside* the claimed range. For example, it teaches an average particle size of 8-10 microns for hex.ZnS:Ag,Cu,Cl (P2), 6-8 microns for cub.ZnS:Ag, Cl (P11), and 6-8 microns for (Zn,Cd)S:Ag, Cl (P20). (See pages 500-501 of The Phosphor Handbook – Reference AO in the 10/24/05 IDS.) Also, in a different chapter on radiology applications, the Phosphor Handbook states:

> In fluorescent screens for radiology use, (Zn,Cd)S:Ag phosphors are used; an emission peak wavelength at 525 nm, providing a spectral luminous efficacy that allows the X-ray imaged on the fluorescent screen to be seen by the human eye. *Because brightness is a very important requirement, a large-grain (average 20 to*

40 μm) phosphor is used." (The Phosphor Handbook at page 528, emphasis added – a copy of which is appended to this Reply.)

Thus, even if there were motivation for a person of ordinary skill in the art to look to the Phosphor Handbook to modify Shimizu, the Phosphor Handbook provides many reasons *not* to use the claimed median grain diameter – it teaches many phosphors with larger grain diameters, and it teaches using larger grain diameters when brightness is important. Accordingly, we ask the Examiner to withdraw the obviousness rejection.

Conclusion

In view of the above, we ask that the application be allowed.

We invite the Examiner to contact the undersigned by telephone to discuss any concerns or questions she may have.

Canceled claims have been canceled without prejudice or disclaimer. Any circumstance in which Applicants have: (a) addressed certain comments of the Examiner does not mean that Applicants concede other comments of the Examiner; (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims; or (c) amended or canceled a claim does not mean that Applicants concede any of the Examiner's positions with respect to that claim or other claims.

An information disclosure statement is also being filed together with this Reply.

Enclosed is a $120.00 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050, referencing 12406-006003.

Respectfully submitted,

Date: 9/5/06

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